

122. (New) The method according to Claim 119, wherein the chemical blowing agent is selected from the group consisting of azodicarbonamide, azodiisobutyronitrile, benzenesulfonhydrazide, 4,4-oxybenzene sulfonylsemicarbazide, p-toluene sulfonyl semicarbazide, barium azodicarboxylate, N,N'-dimethyl-N,N'-dinitrosoterephthalamide, and trihydrazino triazine.

Remarks

Claims 1-15, 17-21, 23-38, 40-44, 46, and 65-122 are pending in the application. Claims 16, 22, 39, 45 and 47-64 are canceled without prejudice or disclaimer thereto. Claims 65 through 122 are added, and encompass subject matter determined by the Patent Office to be patentable. Claims 1 and 24 have been amended, support for which can be found on page 5, lines 24-26. Such amendments are made to address issues only pertaining to form. In view of the amendments and remarks set forth herein, reconsideration, a withdrawal of all rejections, and issuance of a Notice of Allowability are respectfully solicited.

The specification is objected to due to the following informalities. The Office Action alleges that Figures 5A and 5B are referenced in the Brief Description of the Drawings, but nowhere else in the specification. Applicants submit that these drawings, as referenced in the Brief Description of the Drawings which is part of the specification as filed, are intended to provide embodiments illustrating products formed by the methods of the invention. Additionally, the Office Action alleges that the description of Figure 1 on pp. 17-18 references parts 70, 80, 90, 100, and arrows x and y, but that Figure 1 does not contain such parts and arrows. Applicants submit herewith a substitute Figure 1 that contains such parts and arrows. Since this substitute Figure 1 contains features already present in the specification as filed, no new matter is introduced into the application by virtue of this newly-filed figure.

Claims 24 and 47 are objected to because of minor typographical errors set forth in the

to such claim.

Claims 1-2, 4-5, 7-8, 10-14, 47-48, 50-51, 53-54 and 56-58 stand rejected under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent No. 5,922,493 to Humphrey, Jr. et al. ("Humphrey"). In essence, the Office Action alleges that Humphrey discloses all features of the invention and therefore anticipates the invention. Applicants respectfully traverse this rejection.

The present invention is clearly patentable over Humphrey. As taught by Humphrey, and as specifically pointed out in the rejection set forth in the Office Action, Humphrey proposes making porous polyvinylidene fluoride electrodes that are open-cell, as exemplified in col. 9, lines 32-36 and 37-42 which refers to the making of open cell films. In contrast, the present invention is directed to the making of foamed material having a plurality of distinct void spaces formed therein, i.e., the foamed material is closed-cell. Claims 1 and 24 have been amended to reflect this feature. Since Humphrey does not disclose all elements of the invention, it is submitted that it does not anticipate the invention. A withdrawal of this rejection under 35 U.S.C. § 102(e) is therefore respectfully solicited.

Claims 1-2, 7, 13-17, 20-28, 33, 38-40, 43-48, 53, 59-61 and 63-64 stand rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 4,482,582 to Weisman ("Weisman"). The Office Action alleges that Weisman discloses all features of these claims and therefore anticipates the claimed invention. Applicants respectfully traverse this rejection.

Weisman does not anticipate the invention. Similar to Humphrey, Weisman, as appreciated by one skilled in the art, is directed to making open-cell foamed products (col. 11, lines 8-13 of the Office Action). The teaching of open cell foamed materials by Weisman is also acknowledged in the Office Action which states "[t]he foams of the invention are open-celled, thus allowing carbon dioxide to vent from the foamed products." (page 5, paragraph 13). In contrast, Claims 1 and 24 and claims depending therefrom, recite making foams that are closed-cell. Accordingly, since Weisman relates to an entirely different process than the invention, it does not anticipate Claims 1-2, 7, 13-17, 20-28, 33, 38-40, 43-48, 53, 59-61 and 63-64. A withdrawal of this rejection is therefore respectfully solicited.

Claims 6, 9, 15, 23, 52, 59 and 64 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Humphrey. The Office Action alleges that these claims are *prima facie* obvious to form a polymer blend having any amount of crystallinity to produce a foam with the desired conductivity in view of Humphrey. Applicants respectfully traverse this rejection.

As discussed herein, Humphrey does not at all teach or suggest forming closed-cell foams. Thus, one skilled in the art would not be lead to the present invention in view of the teachings of Humphrey. The invention therefore is nonobvious in view of Humphrey. A withdrawal of this rejection under 35 U.S.C. § 103(a) is respectfully solicited.

Claims 24-28, 30-38 and 46 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Humphrey in view of U.S. Patent No. 4,692,381 to Pecsok ("Pecsok"). The Office Action argues that Humphrey teaches various aspects of these claims with the exception of an extrusion process. Pecsok, according to the Office Action, discloses an extrusion method for making PVDF polymers, where PVDF and additives are introduced into a powder blender, melt blended in a twin-screw extruder, and extruded onto a wire. Thus, the Office Action concludes that these claims are obvious. Applicants respectfully traverse this rejection.

For the reasons stated above, Humphrey does not lead a person skilled in the art to the claimed invention. Pecsok does not address the shortcomings of Humphrey. At best, Pecsok merely teaches a conventional process for forming foamed polyvinylidene fluorinde materials.

These claims at issue therefore are not obvious in view of Humphrey applied in combination with Pecsok. A withdrawal of this rejection under 35 U.S.C. § 103(a) is respectfully solicited.

Claims 16-20 and 60-63 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Humphrey in view of U.S. Patent No. 6,169,139 to van Cleeff ("van Cleeff"). The Office Action alleges that Humphrey teaches various aspects of the invention with the exception of a surfactant. The Office Action alleges that van Cleeff discloses mixtures of polyvinylidene fluoride compositions in coating compositions wherein surfactants are added to stabilize the dispersion of the polymer in a solvent in which the polymer is

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insoluble. Thus, the Office Action concludes that the invention is obvious in view of Humphrey and van Cleeff taken in combination.

Humphrey does not lead a person skilled in the art to the claimed invention. van Cleeff does not cure the deficiencies of Humphrey. van Cleeff merely teaches the preparation of a fluoroelastomer latex which allegedly has improved water resistance and adhesion to a coated substrate. van Cleeff does not teach forming foamed materials such as those set forth by the present invention. A withdrawal of this rejection is therefore respectfully solicited.

Claims 3 and 49 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Humphrey in view of U.S. Patent No. 3,879,505 to Boutillier et al. ("Boutiller"). The Office Action alleges that Humphrey teaches various aspects of the invention, but does not teach employing liquid carbon dioxide as a blowing agent. Boutillier, the Office Action argues, teaches using liquid carbon dioxide as a blowing agent. The Office Action thus concludes that the invention is obvious in view of Humphrey applied in combination with Boutiller. Applicants respectfully traverse this rejection.

Humphrey relates to an entirely different process than employed by Applicants in that it allegedly teaches the formation of open-cell foamed materials. Boutillier merely teaches a conventionally known extrusion process for making a thermoplastic material. It does not teach or suggest making a foamed material as recited by the present invention.

A withdrawal of the rejection under 35 U.S.C. § 103(a) over Humphrey in view of Boutillier is respectfully solicited.

Claim 29 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Humphrey in view of Pecsok as applied to Claims 24-28, 30-38 and 46 above and further in view of Boutillier. Claim 29 recites the extrusion method employing liquid carbon dioxide. For the reasons stated above, none of these references lead a person skilled in the art to the claimed invention. Accordingly, these references applied in combination do not render this claim unpatentable. A withdrawal of this rejection is therefore respectfully solicited.

The points of the Examiner being raised in full, a Notice of Allowability is respectfully solicited.

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Respectfully submitted,



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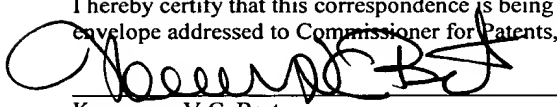


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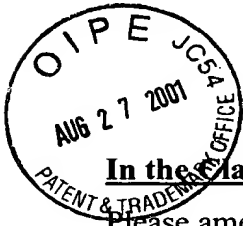
CERTIFICATE OF MAILING

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to Commissioner for Patents, Washington, DC 20231, on August 23, 2001.



Keowanna V.C. Best

Date of Signature: August 23, 2001



Version With Markings To Show Changes Made

In the Claims:

Please amend the following claims:

1. (Amended) A method of producing a foamed material, said method comprising:
 - contacting a mixture comprising a first thermoplastic polymer and a second thermoplastic polymer with a blowing agent, wherein the first thermoplastic polymer has a higher percent crystallinity than the second thermoplastic polymer; and
 - subjecting the mixture to conditions sufficient to create a thermodynamic instability in the mixture to foam the mixture, the mixture comprising the first and second thermoplastic polymers having a percent crystallinity lower than the first thermoplastic polymer;
 - wherein the foamed material formed by said method has a plurality of distinct void spaces formed therein.

24. (Amended) A method of extrusion processing a mixture of thermoplastic materials, said process comprising:
 - introducing at least two thermoplastic polymers into an extruder barrel, the at least two thermoplastic polymers comprising a first thermoplastic polymer and a second thermoplastic polymer, and wherein the first thermoplastic polymer has a **[percent]** higher percent crystallinity than **[that]** the second thermoplastic polymer;
 - heating the mixture of thermoplastic materials to provide a molten blend thereof;
 - contacting the molten blend of thermoplastic materials with a blowing agent; and
 - subjecting the blend to conditions sufficient to create a thermodynamic instability in the blend to foam the blend, wherein the foamed blend has a percent crystallinity lower than the first thermoplastic polymer;
 - wherein the foamed material formed by said method has a plurality of distinct void spaces formed therein.

Please cancel Claims 16, 22, 39, 45 and 47-64 without prejudice or disclaimer thereto.

Please enter the following new claims.

65. (New) The method according to Claim 1, wherein the blowing agent is selected from the group consisting of inorganic agents, organic blowing agents, and chemical blowing agents.

66. (New) The method according to Claim 65, wherein the blowing agent is an inorganic blowing agent selected from the group consisting of carbon dioxide, nitrogen, argon, water, air nitrogen, and helium.

67. (New) The method according to Claim 65, wherein the blowing agent is an organic blowing agent selected from the group consisting of aliphatic hydrocarbons having 1-9 carbon atoms, aliphatic alcohols having 1-3 carbon atoms, and fully and partially halogenated aliphatic hydrocarbons having 1-4 carbon atoms.

68. (New) The method according to Claim 65, wherein the blowing agent is a chemical blowing agent selected from the group consisting of azodicarbonamide, azodiisobutyronitrile, benzenesulfonhydrazide, 4,4-oxybenzene sulfonylsemicarbazide, p-toluene sulfonyl semicarbazide, barium azodicarboxylate, N,N'-dimethyl-N,N'-dinitrosoterephthalamide, and trihydrazino triazine.

69. (New) The method according to Claim 24, wherein the blowing agent is selected from the group consisting of inorganic agents, organic blowing agents, and chemical blowing agents.

70. (New) The method according to Claim 69, wherein the blowing agent is an

inorganic blowing agent selected from the group consisting of carbon dioxide, nitrogen, argon, water, air nitrogen, and helium.

71. (New) The method according to Claim 69, wherein the blowing agent is an organic blowing agent selected from the group consisting of aliphatic hydrocarbons having 1-9 carbon atoms, aliphatic alcohols having 1-3 carbon atoms, and fully and partially halogenated aliphatic hydrocarbons having 1-4 carbon atoms.

72. (New) The method according to Claim 69, wherein the blowing agent is a chemical blowing agent selected from the group consisting of azodicarbonamide, azodiisobutyronitrile, benzenesulfonhydrazide, 4,4-oxybenzene sulfonylsemicarbazide, p-toluene sulfonyl semicarbazide, barium azodicarboxylate, N,N'-dimethyl-N,N'-dinitrosoterephthalamide, and trihydrazino triazine.

73. (New) A method of producing a foamed material, said method comprising:
contacting a mixture comprising a first thermoplastic polymer and a second thermoplastic polymer with a blowing agent comprising a surfactant, wherein the surfactant is a copolymer selected from the group consisting of a graft copolymer, a block copolymer, and a random copolymer, wherein the first thermoplastic polymer has a higher percent crystallinity than the second thermoplastic polymer; and

subjecting the mixture to conditions sufficient to create a thermodynamic instability in the mixture to foam the mixture, the mixture comprising the first and second thermoplastic polymers having a percent crystallinity lower than the first thermoplastic polymer.

74. (New) The method according to Claim 73, wherein the blowing agent is carbon dioxide.

75. (New) The method according to Claim 74, wherein the carbon dioxide is liquid carbon dioxide.

76. (New) The method according to Claim 74, wherein the carbon dioxide is supercritical carbon dioxide.

77. (New) The method according to Claim 74, wherein at least one of the first and second thermoplastic materials is amorphous.

78. (New) The method according to Claim 77, wherein the mixture of thermoplastic materials is amorphous.

79. (New) The method according to Claim 74, wherein at least one of the first and second thermoplastic materials is semicrystalline.

80. (New) The method according to Claim 74, wherein the first thermoplastic polymer is semicrystalline and the second thermoplastic material is amorphous.

81. (New) The method according to Claim 80, wherein the mixture of thermoplastic materials is amorphous.

82. (New) The method according to Claim 74, wherein the first and second thermoplastic polymers are each independently selected from the group consisting of PVDF, sPS, PTFE, PVC, Nylon (6,6), polyvinylmethylether, PP, PE, HDPE, PS, PMMA, polyisobutylene, PVA, PDMS, PEO, poly(phenylene oxide), PVF, PVDC, PVC, PVOH, PVAc, PC, ethyl acetate, PET, poly(ethylene naphthalate), poly(ϵ -caprolactone), poly(ether imide), chemical derivatives thereof, and mixtures thereof.

83. (New) The method according to Claim 74, wherein the first thermoplastic polymer is selected from the group consisting of PVDF, sPS, PTFE, PVC, Nylon (6,6), polyvinylmethylether, PP, PE, HDPE, PVF, PVDC, PVOH, PVAc, PC, ethyl acetate, PET,

poly(ethylene naphthalate), poly(ϵ -caprolactone), poly(ether imide), chemical derivatives thereof, and mixtures thereof; and the second thermoplastic polymer is selected from the group consisting of PS, PMMA, polyisobutylene, PVA, PDMS, PEO, poly(phenylene oxide), PC, chemical derivatives thereof, and mixtures thereof.

84. (New) The method according to Claim 74, wherein the first thermoplastic polymer is PVDF and the second thermoplastic polymer is PMMA.

85. (New) The method according to Claim 74, wherein said subjecting step comprises separating the mixture from the blowing agent to foam the mixture.

86. (New) The method according to Claim 85, wherein said step of separating the mixture comprises venting the blowing agent.

87. (New) The method according to Claim 74, wherein the blowing agent further includes a co-solvent.

88. (New) The method according to Claim 74, wherein the blowing agent is carbon dioxide and the surfactant comprises a CO₂-philic segment.

89. (New) The method according to Claim 88, wherein the CO₂-philic segment comprises a fluoropolymer.

90. (New) The method according to Claim 88, wherein the CO₂-philic segment comprises a fluoropolymer formed from at least one monomer selected from the group consisting of fluoroacrylate monomers, fluoroolefin monomers, fluorostyrene monomers, fluoroalkylene oxide monomers, fluorinated vinyl alkyl ether monomers, and mixtures thereof.

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91. (New) The method according to Claim 74, wherein the surfactant comprises a CO₂-phobic segment.

92. (New) The method according to Claim 91, wherein the CO₂-phobic segment is a polymer formed from at least one monomer selected from the group consisting of styrenics, α -olefins, ethylene oxides, dienes, amides, esters, sulfones, sulfonamides, imides, thiols, alcohols, diols, acids, ethers, ketones, cyanos, amines, quaternary ammonium salts, acrylates, methacrylates, thiozoles, and mixtures thereof.

93. (New) The method according to Claim 74, wherein the blowing agent further includes a modifier selected from the group consisting of a reactant modifier, water, a plasticizing agent, an anti-bacterial agent, a toughening agent, a processing aid, a colorant, a dye, a flame retardant, and mixtures thereof.

94. (New) The method according to Claim 24, wherein the blowing agent is selected from the group consisting of inorganic agents, organic blowing agents, and chemical blowing agents.

95. (New) The method according to Claim 94, wherein the blowing agent is an inorganic blowing agent selected from the group consisting of carbon dioxide, nitrogen, argon, water, air nitrogen, and helium.

96. (New) The method according to Claim 94, wherein the blowing agent is an organic blowing agent selected from the group consisting of aliphatic hydrocarbons having 1-9 carbon atoms, aliphatic alcohols having 1-3 carbon atoms, and fully and partially halogenated aliphatic hydrocarbons having 1-4 carbon atoms.

97. (New) The method according to Claim 94, wherein the blowing agent is a chemical blowing agent selected from the group consisting of azodicarbonamide, azodiisobutyronitrile, benzenesulfonhydrazide, 4,4-oxybenzene sulfonylsemicarbazide, p-

toluene sulfonyl semicarbazide, barium azodicarboxylate, N,N'-dimethyl-N,N'-dinitrosoterephthalamide, and trihydrazino triazine.

98. (New) A method of extrusion processing a mixture of thermoplastic materials, .
said process comprising:

introducing at least two thermoplastic polymers into an extruder barrel, the at least two thermoplastic polymers comprising a first thermoplastic polymer and a second thermoplastic polymer, and wherein the first thermoplastic polymer has a higher percent crystallinity than the second thermoplastic polymer;

heating the mixture of thermoplastic materials to provide a molten blend thereof;

contacting the molten blend of thermoplastic materials with a blowing agent comprising at least one surfactant, wherein the surfactant is a copolymer selected from the group consisting of a graft copolymer; and

subjecting the blend to conditions sufficient to create a thermodynamic instability in the blend to foam the blend, wherein the foamed blend has a percent crystallinity lower than the first thermoplastic polymer.

99. (New) The method according to Claim 98, wherein said step of contacting the molten blend of thermoplastic materials occurs in a mixing section of the extruder.

100. (New) The method according to Claim 98, wherein said subjecting step comprises separating the blowing agent from the molten blend of thermoplastic polymers to form a foamed thermoplastic mixture.

101. (New) The method according to Claim 100, wherein said step of separating the blowing agent from the blend comprises venting the blowing agent.

102. (New) The method according to Claim 98, wherein the blowing agent is carbon dioxide.

103. (New) The method according to Claim 102, wherein the carbon dioxide is liquid carbon dioxide.

104. (New) The method according to Claim 102, wherein the carbon dioxide is supercritical carbon dioxide.

105. (New) The method according to Claim 98, wherein at least one of the first and second thermoplastic materials is amorphous.

106. (New) The method according to Claim 105, wherein the blend of thermoplastic materials is amorphous.

107. (New) The method according to Claim 106, wherein at least one of the first and second thermoplastic materials is semicrystalline.

108. (New) The method according to Claim 105, wherein the first thermoplastic polymer is semicrystalline and the second thermoplastic material is amorphous.

109. (New) The method according to Claim 98, wherein the first thermoplastic polymer and the second thermoplastic polymer are each independently selected from the group consisting of PVDF, sPS, PTFE, PVC, Nylon (6,6), polyvinylmethylether, PP, PE, HDPE, PS, PMMA, polyisobutylene, PVA, PDMS, PEO, poly(phenylene oxide), PVF, PVDC, PVOH, PVAc, PC, poly(ethyl acetate), PET, poly(ethylene naphthalate), poly(ϵ -caprolactone), poly(ether imide), chemical derivatives thereof, and mixtures thereof.

110. (New) The method according to Claim 98, wherein the first thermoplastic polymer is selected from the group consisting of PVDF, sPS, PTFE, PVC, Nylon (6,6), polyvinylmethylether, PP, PE, HDPE, PVF, PVDC, PVOH, PVAc, PC, poly(ethyl acetate), PET, poly(ethylene naphthalate), poly(ϵ -caprolactone), poly(ether imide), chemical derivatives thereof, and mixtures thereof; and the second thermoplastic polymer is selected from the group consisting of PS, PMMA, polyisobutylene, PVA, PDMS, PEO, poly(phenylene oxide), PC, chemical derivatives thereof, and mixtures thereof.

111. (New) The method according to Claim 98, wherein the first thermoplastic polymer is PVDF and the second thermoplastic polymer is PMMA.

112. (New) The method according to Claim 98, wherein the blowing agent further includes a co-solvent.

113. (New) The method according to Claim 98, wherein the surfactant comprises a CO₂-philic segment.

114. (New) The method according to Claim 113, wherein the CO₂-philic segment comprises a fluoropolymer

115. (New) The method according to Claim 113, wherein the CO₂-philic segment comprises a fluoropolymer formed from at least one monomer selected from the group consisting of fluoroacrylate monomers, fluoroolefin monomers, fluorostyrene monomers, fluoroalkylene oxide monomers, fluorinated vinyl alkyl ether monomers, and mixtures thereof.

116. (New) The method according to Claim 98, wherein the surfactant comprises a CO₂-phobic segment.

117. (New) The method according to Claim 116, wherein the CO₂-phobic segment is a polymer formed from at least one monomer selected from the group consisting of styrenics, α -olefins, ethylene oxides, dienes, amides, esters, sulfones, sulfonamides, imides, thiols, alcohols, diols, acids, ethers, ketones, cyanos, amines, quaternary ammonium salts, acrylates, methacrylates, thiozoles, and mixtures thereof.

118. (New) The method according to Claim 98, wherein the blowing agent further includes a modifier selected from the group consisting of a reactant modifier, water, a plasticizing agent, an anti-bacterial agent, a toughening agent, a processing aid, a colorant, a dye, a flame retardant, and mixtures thereof.

119.(New) The method according to Claim 98, wherein the blowing agent is selected from the group consisting of inorganic agents, organic blowing agents, and chemical blowing agents.

120. (New) The method according to Claim 119, wherein the blowing agent is an inorganic blowing agent selected from the group consisting of carbon dioxide, nitrogen, argon, water, air nitrogen, and helium.

121. (New) The method according to Claim 119, wherein the blowing agent is an organic blowing agent selected from the group consisting of aliphatic hydrocarbons having 1-9 carbon atoms, aliphatic alcohols having 1-3 carbon atoms, and fully and partially halogenated aliphatic hydrocarbons having 1-4 carbon atoms.

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122. (New) The method according to Claim 119 , wherein the chemical blowing agent is selected from the group consisting of azodicarbonaminde, azodiisobutyronitrile, benzenesulfonhydrazide, 4,4-oxybenzene sulfonylsemicarbazide, p-toluene sulfonyl semicarbazide, barium azodicarboxylate, N,N'-dimethyl-N,N'-dinitrosoterephthalamide, and trihydrazino triazine.